DESIGN GUIDELINES

FOR

WATER AND SEWER FACILITIES

MARCH 2017

CITY OF SANTA ANA
# CITY OF SANTA ANA

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FOR

WATER AND SEWER FACILITIES

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SECTION 100

GENERAL DESIGN REQUIREMENTS

100.1 PURPOSE

The purpose of these Design Guidelines is to provide Applicants (developer/builder) with a general understanding of the design criteria for the City of Santa Ana water and sewer facilities for new development or re-development projects. These Design Guidelines are to be used in conjunction with, and as a supplement to, the City of Santa Ana Municipal Code, the City of Santa Ana Standard Plans and Specifications, and the Standard Specifications for Public Works Construction.

100.2 PROCEDURAL GUIDELINES AND STANDARD PLANS

The procedural guidelines for processing water and sewer improvement plans for development and re-development projects are described within the City’s Municipal Code and shall be in conformity with the procedures established by the Planning Department and the Director of Public Works.

All water and sewer improvements shall be designed and constructed in accordance with the City of Santa Ana Standard Plans and Specifications, these Design Guidelines, and the Standard Specifications for Public Works Construction, current edition.

All facilities to be operated and maintained by the City shall be located in public right-of-way (streets or recorded easements).

100.3 PRELIMINARY FEASIBILITY INVESTIGATION

In some areas, and/or for larger projects, a feasibility investigation study may be necessary to determine whether the existing City water or sewer facilities are adequate to service the needs of the proposed development (or redevelopment) or if new water or sewer facilities are required to be constructed to handle the additional demands. In these cases, the Applicant (developer/builder) will be responsible for the full cost of the study, if required by the City. The City reserves the right to perform the study.

100.4 VERIFICATION OF SERVICE AVAILABILITY

If service verification is requested by the Applicant (developer/builder), the service verification request shall be addressed to the City of Santa Ana Public Works Agency, Water Resources Division, and must be accompanied by an 8-⅛ inches by 11 inches vicinity map and two (2) copies of the tentative tract map showing the proposed services and their points of connection to the existing City water and sewer facilities. Conceptual sizing of the water and sewer systems shall be shown along with dwelling unit densities, the estimated water and sewer demands, and the fire flow requirements from the Fire Department. The normal information required on tentative tract maps is also required.

Some larger development or redevelopment projects may require the City to perform a hydraulic distribution network analysis. In these cases, the Applicant (developer/builder) will be responsible for the full cost of this analysis.
In accordance with California Water Code Section 10912, water supply assessments and water service verifications will need to be prepared by the Applicant (developer/builder) for: developments of 500 dwelling units or more; a shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor; a commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space; a hotel or motel, or both, having more than 500 rooms; industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area; a mixed-use project that includes one or more of the projects specified above; or a project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

100.5 CONSTRUCTION PROJECTS AND SERVICE REQUIREMENTS

Any and all proposed water and sewer improvements to serve a property/parcel or development must be reviewed and approved by the City of Santa Ana before these improvements can be constructed or modified.

Development or re-development projects generally include residential housing tracts, local and regional retail centers, and business and industrial parks where the Applicant (developer/builder) furnishes all the labor, equipment, and materials to construct the new water and sewer facilities within the project site.

A new water service will be required if one does not currently exist at the property/parcel. An additional service may be needed or modifications to the existing services if:

- Existing meter is too small or too large for the amount of water needed for the project.
- The project wants to add or remove a water service.
- Fire services will be modified or constructed as part of the project.
- Irrigation services will be modified or constructed as part of the project. All planting, irrigation and landscape-related improvements shall be subject to the requirements of the City of Santa Ana’s Municipal Code Section 41-1501.
- The existing service line has been out of service for ten (10) years or more as required by the City of Santa Ana’s Municipal Code Section 39-25 (m).

If new or modified water services are needed, project plans must be submitted for the City’s approval, including the plumbing plans, showing all external and internal water fixtures, fire sprinkler system, as well as the irrigation plans. The submittal shall include the total number of fixture units to be served by the new or modified water service, the fire sprinkler system design criteria, and the future expected flow rates of the irrigation system.

When a sewer connection is required, and a lateral to the property/parcel does not exist, the Applicant (developer/builder) will be responsible to prepare a plan for its construction, showing size, location, depth, slope and the location of the sewer clean-out. In addition, a new sewer lateral to a property/parcel may be needed if:

- Existing lateral is a break-in connection and not a wye connection.
- Existing lateral is too small or too large for the amount of sewer generated by the project.
- Condition of the existing lateral is structurally deficient.
- Existing lateral has been out of service for ten (10) years or more.
100.6 SPECIAL CONDITIONS FOR LAND SUBDIVISIONS AND CONDOMINIUMS

All projects must conform to the requirement that each dwelling unit or building under separate ownership must be provided with its own public service connection and meter. The City reserves the right to limit the number of houses or buildings, or area of land under one ownership, to be supplied by one public service connection and meter.

- **Land Subdivisions** – When property with an existing meter is subdivided, the service connection and meter shall be considered as belonging to the lot or parcel of land, which it directly enters. A meter shall not be used to supply adjoining property of the same or a different owner. The City of Santa Ana will require a separate public service and meter for each lot at the time of subdivision.

- **Condominiums** – Require a separate meter for each condominium (except in unusual cases).

100.7 REMODELS / TENANT IMPROVEMENT PROCEDURES

If the project will include the installation of new plumbing fixtures, the City of Santa Ana requires that the adequacy of the existing meter be evaluated and that the meter be upgraded if the addition of new plumbing fixtures and/or landscaping will cause water flow rates to exceed the capacity of the existing meter. The Applicant (developer/builder) shall submit a plumbing plan showing all future plumbing fixtures including existing plumbing fixtures to remain and landscape plans showing the future expected flow rates of the irrigation system. A listing of plumbing fixtures can be supplied in place of a plumbing plan. The City of Santa Ana will calculate the required meter size and determine if a meter upgrade is required.

100.8 SPECIAL CONDITIONS FOR MULTI-FAMILY DWELLINGS

In an effort to promote water conservation and accountability, and to limit future customer service disruptions, it is the policy of the City to require that all new developments have individual public meters serving multi-family dwellings (such as: apartments, condominiums, townhomes, mobile home parks, multi-tenant industrial and commercial centers, and mixed use developments). Such public water metering will be required regardless of whether the onsite water distribution system is publicly or privately owned and maintained. This requirement will not be imposed on low-income housing, student dormitories, long-term health care facilities, time-share properties, high-rise buildings and hotels.

All public meters shall be located within public right-of-way or within an easement. At no time shall the public water service and/or meter be located within a building or within private property.

For multi-family residential dwelling units within multi-story building, the Applicant (developer/builder) may request a public water master meter serving the multi-story building as long as the Applicant (developer/builder) will be responsible for sub-metering of each individual residential units (apartments or condominiums) within the multi-family property. In addition, the Applicant shall submit an agreement to the City that the sub-metering of each individual unit within the multi-family property will be maintained and monitored to ensure the City’s policy is met for these multi-story buildings. Provisions for the ongoing maintenance and operation of the private sub-meters shall be the responsibility of the Applicant (developer/builder) and not the City.

As a minimum, each multi-story building shall be provided with at least one public water master meter.
The Applicant (developer/builder) of proposed multi-family dwellings shall endeavor to have a “pre-design” meeting with the City of Santa Ana Planning Department and the City of Santa Ana Public Works Agency to discuss the methods being proposed to meet the requirements of this policy.

100.9 IMPROVEMENT PLAN REQUIREMENTS

All plans submitted to the City of Santa Ana for plan checking and approval of water and sewer facilities shall be submitted on standard 24" x 36", maximum overall size sheets, with the City of Santa Ana Title Block. These plans shall conform to the “City of Santa Ana Public Works Agency Engineered CAD Standards”. These standards have been implemented to promote exchangeability and reusability by creating a uniform set of procedures to be used within the City’s Public Works Agency (PWA) but also for consultants submitting plans and other CADD documents intended for PWA storage and reuse.

All water and sewer improvements shall be designed in accordance with the City of Santa Ana Standard Plans and Specifications, these Design Guidelines, and the Standard Specifications for Public Works Construction, current edition.

100.9.1 Specific Improvement Plan Requirements:

1. Title Sheet
   A. Project Title, Tract/Parcel Map Development Number, or Project Name.
   B. Location Map showing general area with project noted.
   C. Index Map is required and must contain all of the following information:
      1. Scale: 1” = 100 feet.
      2. All existing and proposed water and sewer mains, fire hydrants, water valves, meters/services, manholes and clean-outs.
      3. The size and material for all mains.
      4. The direction of flow for all sewer mains, the number of manholes and clean-outs.
      5. Lot lines for the proposed development, footprints of buildings, total square footage, number of stories, and service stub locations for each lot.
      6. North arrow and street names.
      7. Legend of symbols and lines.
      8. All proposed easements for City of Santa Ana water and sewer facilities.
   D. Signature block – City’s approval of water and sewer facilities. Indicate which facilities are included on the water and sewer improvement plans. Provide signature block for city of Santa Ana Water Resources Manager.
   E. Orange County Fire Authority approval.
   G. Name, address, and phone number of engineering firm; name, address, and phone no. of developer; and legal description of property (Tract/Lot, Parcel Map No.)
H. Quantity estimates, categorized by water, sewer and non-domestic water facilities may appear on Title Sheet.

I. Index of sheets.


K. Revision block.

2. Second Sheet

   Typically, the second sheet of the plan set will have the following information:

   A. Quantity estimates (if not shown on Title Sheet).

   B. General Notes.

   C. Utility, addresses, and phone numbers, including but not limited to: gas, telephone, power, cable TV, water, sewer, recycled water, and storm drain.

   D. City’s Standard Water and Sewer Construction Notes.

   E. Typical street cross sections showing street widths to right-of-way, location of sidewalks and curbs, all utilities, including gas, telephone, cable TV, and electrical facilities, storm drains, and proposed water and sewer facilities.

3. Plan and Profile Sheets

   Separate plan and profile sheets are required for all water and sewer pipelines, as follows:

   A. Scale: 1-inch = 20-feet (minimum) horizontal and 1-inch = 2-feet vertical. The vertical scale can be changed to 1-inch = 4-feet vertical when grades are steep, but this will need specific approval by the City’s Water Resources Division.

   B. The plan and profile should be on same sheet and aligned (with profiles shown on the top of the sheet). Sewer lateral profiles, if required, shall be shown on separate sheets.

   C. Each sheet shall list the construction notes needed for that sheet.

   D. Existing water, sewer and storm drain facilities adjacent to development must be shown. Size and material of these facilities must be indicated.

   E. Easements dedicated to the City of Santa Ana for water and sewer facilities must appear on plans.

   F. Proposed building or dwelling unit pad elevations must be shown.

   G. Drawings shall show on the plan and profile sheets the position of all other existing or proposed underground facilities. This shall include water, sewer, and storm drain crossing elevations.

   H. Storm drain alignment shall be indicated in the plan view and all crossings of water facilities and the storm drain shall be shown in the storm drain profile. Where water lines cross over the storm drains the top of the storm drain and the bottom of the water line must be shown, along with the proposed depth of cover.

   I. All water and sewer facilities to be operated and maintained by the City shall be located in public right-of-way (streets or recorded easements) which shall be clearly shown and fully dimensioned on the improvements plans.
100.9.2 Signatures

Each sheet of the improvement plans submitted shall be signed by the Civil Engineer responsible for that design, except that a sheet of complex structural, mechanical or electrical plans shall be designed by the Professional Engineer responsible for that design. Each sheet shall also be stamped or sealed by the Professional Engineer and shall include the expiration date of their Registration Certificate noted.

Civil and Professional Engineers signing improvement plans shall be registered by the State of California.

Plan revisions subsequent to the City’s approval shall be resigned prior to resubmittal for the City’s re-approval.

100.10 SUBMITTAL REQUIREMENTS

Any and all proposed water and sewer improvements to serve a property/parcel or development must be reviewed and approved by the City of Santa Ana before these improvements can be constructed or modified. The water and sewer improvements must be reflected on civil engineering plans and reviewed and approved through the City’s plan approval process. Plans submitted for approval shall be accompanied by a letter of transmittal addressed to the City. Plans shall be checked by the Applicant for consistency, accuracy, meeting of City’s CAD Standards, and conformance with the City’s Standard Plans and Specifications, these Design Guidelines, and the Standard Specifications for Public Works Construction prior to submission for the City’s approval. If plans have obviously not been checked by the Applicant, they will be returned not reviewed by the City.

Check prints shall accompany revised plans which are resubmitted for approval. Resubmitted plans shall be accompanied by a letter of transmittal addressed to the City.

100.10.1 Individual Tract Improvement Plans:

In addition to the requirements described in Section 100.9, the Applicant (developer/builder) shall submit the following items for first review of residential, commercial, and industrial developments:

1. Water and sewer improvements plans including the site plans, plumbing plans and the irrigation plans. Water, sewer, and structural design calculations shall accompany the plans, if appropriate.
2. Tract/parcel map showing gross acreage, street names, and any City of Santa Ana easements.
3. Grading plans.
4. Engineer’s quantity estimate for water and sewer facilities, including the total number of fixture units, estimated water and sewer flow rates, and expected flow rates of the irrigation system.

100.10.2 Non-Residential Plans:

In addition to the requirements described in Section 100.10.1, the Applicant (developer/builder) shall submit the following items for first review of all commercial or industrial developments:

1. Site utility plans showing: property lines; “footprint” of buildings; all on-site public and private fire hydrants; and all backflow devices.
2. Plans stamped and signed by Orange County Fire Authority.
3. Fire services will require a backflow prevention device (minimum double check valve assembly), as determined by the City and as required by the City’s Municipal Code.

4. Non-residential water service will be required to have a reduced pressure principal backflow assembly, as determined by the City and as required by the City’s Municipal Code.

5. Plumbing plans including the number of fixture units, and calculated water and sewer demand.

6. Irrigation plans including the expected flow rates of the irrigation system and all calculations required by City’s Municipal Code Section 41-1501.

**100.10.3 Fire Service Requirements**

All 3-inch diameter and larger fire service connections will require, at a minimum, a “N-style” double check detector assembly with a by-pass meter. For all fire services with a contaminant control hazard, a reduced pressure principle backflow assembly (or a reduced pressure detector assembly) will be required, as determined by the City and as required by the City’s Municipal Code.

All fire service connections smaller than 2-inches in diameter, required by either NFPA 13D (one & two family residential fire sprinkler systems) or NFPA 13R (multi-family residential fire sprinkler systems), shall be provided with the following:

- Closed fire sprinkler systems will require a double check valve backflow device.
- Open (flow-through) fire sprinkler systems will not require a backflow device as long as the ends of these systems are connected to a fixture that is regularly used. This prevents the water in the fire system from becoming stagnant.

The required backflow device shall be located adjacent to the building but upstream of the residential building valve, and shall be testable, and accessible for maintenance and repairs.

A “domestic water shutoff valve” may be used to effectively negate the need for any additional water demand by the home in the event of a fire. The design of the “domestic water shutoff valve” is such that if there is a fire sprinkler operation/activation during domestic usage, the valve will automatically shut off the flow to the domestic system and divert the available water supply to the sprinkler system, thereby eliminating the lower flow into the sprinkler system that might otherwise be caused by possible significant domestic water usage. The use of a domestic valve can eliminate the need to combine the domestic and sprinkler demand (gallons per minute) when performing the hydraulic design calculation.

**100.10.4 Irrigation Service Requirements**

Facilities for irrigation of new and existing parks, medians, landscaped public area or landscaped areas, lawns, or gardens surrounding condominiums, townhouses, apartments, and industrial parks shall be designed and installed in such a way as to conserve water. Rate and extent of application of water shall be controlled by the owner so as to minimize the water usage.

All planting, irrigation and landscape-related improvements shall meet the requirements of the City of Santa Ana’s Municipal Code Section 41-1501.

Landscape and irrigation plans must be reviewed by the City of Santa Ana. Irrigation plans shall include any calculations required per Santa Ana’s Municipal Code Section 41-1501.
100.11 EASEMENTS

All water and sewer facilities to be operated and maintained by the City shall be located in public right-of-way (streets or recorded easements). The Applicant (developer/builder) shall grant, or cause to be granted to the City of Santa Ana, without cost to the City, all necessary easements for construction, installation, maintenance and access to the water and sewer facilities, across all privately-owned lands to be traversed by the facilities, which easements shall be in a form and condition of title satisfactory to the City of Santa Ana and shall be executed by all necessary parties having an interest in said lands.

All easement documents and plat map and legal descriptions shall be submitted to the County of Orange for recording. A copy shall be mailed to the property owner(s) after recording.

If an easement outside of the public right-of-way is required for construction and/or maintenance of water or sewer facilities, including but not limited to, water mains, sewer mains, manholes, hydrants, meter vaults, backflow assemblies, and any other water appurtenances; its minimum width shall be twenty (20) feet for water and sewer mains; and a minimum of five (5) feet on all sides for meters, fire hydrants, meter vaults, backflow assemblies, and other appurtenances, unless otherwise determined by the City of Santa Ana. Means of maintaining access to the easement must be provided and an all-weather surface constructed.

An easement running parallel with a lot line shall not be split so as to occur on two lots but shall be laid out so that the easement is located all on one lot.

In multi-family residential complexes or business parks, the Applicant may dedicate a “blanket easement” over all internal paved areas to the City as long as it covers the minimum area noted above.

Along public streets, a three (3) or five (5) foot wide utility parallel easement on private property for City of Santa Ana may be required depending upon public right-of-way widths and sidewalk locations.

The easement, title report, and legal descriptions with accompanying sketch and plans shall be prepared by the Applicant's engineer, and two copies of which shall be sent to the City, or easements shall be shown on a tract or parcel map.

**NOTE:** Approval by the City of Santa Ana of water and sewer improvement plans will not be given for the tract water and sewer systems until all easements have been obtained.

100.12 SEPARATION REQUIREMENTS

100.12.1 Horizontal Separation

Department of Drinking Water (DDW) regulations require that new water mains shall be installed at least ten (10) feet horizontally from and one (1) foot above, any parallel pipeline conveying:

- Untreated sewage;
- Primary or secondary treated sewage;
- Disinfected secondary recycled water; and
- Hazardous fluids such as fuels, industrial wastes, and wastewater sludge.

New water mains shall be installed at least four (4) feet horizontally from, and one (1) foot vertically above, any parallel pipeline conveying: disinfected tertiary recycled water (Title 22); and storm drainage.
The minimum separation distances noted above shall be measured from the nearest outside edge of each pipe barrel.

If crossing a pipeline containing sewage, recycled water, or storm drainage, a new water main shall be constructed no less than 45-degrees to and at least one (1) foot above the pipeline. No connection joints shall be made in the water main within eight (8) horizontal feet of the other pipeline.

The vertical separation noted above is required only when the horizontal distance between a water main and the pipeline carrying the above fluids is less than ten (10) feet.

With DDW’s approval, newly installed water mains may be exempt from the separation distances noted above if the newly installed main is:

- Less than 1,320 linear feet in length;
- Replacing an existing main, installed in the same location, and has a diameter no greater than six (6) inches more than the diameter of the main it is replacing; and
- Installed in a manner that minimizes the potential for contamination, including, but not limited to: sleeving the newly installed main; or utilizing upgraded piping material.

100.12.2 Vertical Separation

Normally, water, sewer, recycled water, and storm drains shall be located vertically from the street surface in order of the higher quality, i.e., domestic water shall be above recycled water/storm drains, and recycled water/storm drains shall be above sewer.

Whenever a crossing must occur where a sewer main passes within one (1) foot of a domestic water main, special construction will be required. Encasement may be required if vertical separation requirements cannot be met. One of the following types of encasement may be required:

1. Reinforced concrete encasement, a minimum thickness of 6 inches.
2. Piping within a continuous steel casing which shall have a thickness of not less than 1/4 inch.

If a sewer is above a water main, the special construction shall extend a minimum of eight (8) feet of horizontal clearance on both sides, or if not feasible, center the piece of new water pipe under the crossing to maximize this horizontal clearance.

If a sewer is located below a water main, and within a vertical distance of a one (1) foot clearance distance, the special construction shall extend a minimum of four (4) feet of horizontal clearance on both sides of the crossing. These construction requirements shall not apply to house laterals that cross perpendicular less than one (1) foot below a pressure water main.

100.12.3 Separation from New and Existing Utilities

Construction of new utilities or structures shall maintain a minimum of five (5) foot parallel separation and a minimum of one (1) foot vertical separation from all City of Santa Ana water and sewer pipelines unless written authorization is obtained from the City of Santa Ana Public Works Executive Director of Public Works. Construction of new water and sewer facilities shall maintain a minimum of five (5) foot parallel separation and one (1) foot minimum vertical separation from all existing utilities and structures unless written authorization is obtained from the City’s Public Works Executive Director of Public Works.
100.13 PROTECTION OF PUBLIC WATER SUPPLY

All water services shall be subject to the provisions of the City of Santa Ana’s Municipal Code Section 39-28, “Protection of Public Water Supply. The following summarizes the cross-connection provisions included within the City’s Municipal Code.

The purpose of Section 39-28 of the Municipal Code is to protect the public water supply: against actual or potential cross-connections by isolating within the premises contamination that may occur because of some undiscovered or unauthorized cross-connection on the premises; to eliminate existing connections between drinking water systems and other sources of water that are not approved as safe and potable for human consumption; and to eliminate cross-connections in the future.

The City of Santa Ana recognizes that the water purveyor has a responsibility to take all reasonable precautions to protect the integrity of the public water supply. Thus, in the exercise of this responsibility, the City of Santa Ana may need to conduct a cross-connection control survey of the Applicant’s plumbing system. The City will not address internal protection requirements. The City recommends that the Applicant or his engineer contact the local health agency (Orange County Health Care Agency) to ensure the on-site water system complies with current plumbing codes, and requirements of the local health agency. The City has a cross-connection specialist who is available for consulting on any questions regarding cross-connections.

The City of Santa Ana will not provide any water service to any premises unless the public domestic water supply is protected as required by State, County and City of Santa Ana regulations.

Except in special situations, it is now required to have back-flow devices installed for:

- All commercial domestic water services.
- All industrial domestic water services.
- All fire service connections except as noted in Section 100.10.3.
- All private domestic systems or fire line systems having two, or more, points of connection to the City’s water mains.
- All irrigation services on the domestic water system.
- All domestic services to sites where there is recycled water on-site.

Back-flow prevention devices shall be approved by the U.S.C. Foundation for Cross-Connection Control and shall be installed by and at the expense of the customer.

The customer shall have the device: tested annually by a tester certified by the Orange County Health Care Agency; service such devices to maintain them in satisfactory operating condition; and shall overhaul or replace such devices if they are found defective. Test results shall be provided before the City will accept service as complete. Records of such annual tests, repairs, and overhauling shall be kept by the customer and copies forwarded to the City of Santa Ana’s cross-connection specialist and local health agency within ten (10) working days after testing.

Additional reference for guidelines to when, why, and what types of back-flow and cross-connection control devices are approved may be found in:

A. Section 39-28 of the City of Santa Ana Municipal Code.
B. “Regulations Relating to Cross-Connections”, California Administrative Code - Title 17 - Public Health (Sections 7583 through 7605).

C. “Manual of Cross-Connection Control”, published by Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, School of Engineering.


100.13.1 Backflow Device Location

All commercial and industrial domestic water services, and domestic services to sites where there is recycled water on-site, will require that a Reduced Pressure Principle backflow assembly be installed immediately downstream of the water meter. The device must be installed in accordance with the City of Santa Ana’s Standard Plans. The assembly must be installed above ground and cannot be installed in an underground vault.

These assemblies can be installed in such a manner as to be screened from view, but must be easily accessible to City’s personnel to facilitate testing and servicing. There must be a minimum of five (5) feet of clearance on all sides of the backflow assembly. In addition, a ten (10) foot wide easement must be dedicated to the City of Santa Ana from the public right-of-way to the backflow assembly.

All fire services requiring a backflow assembly as specified in Section 100.10.3 (Fire Service Requirements) must be installed in accordance with City of Santa Ana’s Standard Plans. The required backflow assemblies must be on private property and shall be located adjacent to the building but upstream of the residential building valve, and shall be testable and easily accessible for maintenance and repairs.

The Orange County Fire Authority will determine the final placement of all fire services backflow assemblies. A ten (10) foot wide easement must be dedicated to the City of Santa Ana from the public right-of-way to the backflow assembly.

100.14 FIRE DEPARTMENT APPROVAL

Applicant (developer/builder) shall obtain approval from the Orange County Fire Authority for fire hydrant spacing, the required fire flows for the development, and the final placement of all fire services backflow assemblies. Fire Department’s approval shall be coordinated by the Applicant (developer/builder) and will be required prior to the City’s approval of the water improvement plans.

100.15 USE OF CITY’S SEWAGE FACILITIES

Article III of the City of Santa Ana’s Municipal Code, Chapter 39, deals with the City of Santa Ana’s sewer regulations. The City of Santa Ana sewers transport the sewage to the Orange County Sanitation Districts treatment facilities. Orange County Sanitation District has regulations on the types of wastes that are allowed to be discharged into its treatment facilities to meet its discharge requirements. Commercial or industrial Applicants shall contact Orange County Sanitation District for these regulations and any special discharge permit requirements and fees. If only domestic wastewater is to be discharged from the project, only the regulations stipulated within the City’s Municipal Code will govern.

100.16 FATS, OILS AND GREASE CONTROL

Section 39-56 of the City of Santa Ana’s Municipal Code specifies the City’s regulations regarding fats, oils and grease control. The purpose of these regulations is to allow the maximum beneficial public use of the
City’s sewer services and facilities while preventing blockages of the public sewer lines resulting from discharges of fats, oils and grease (FOG) to the sewer facilities and to specify appropriate FOG discharge requirements for food service establishments (FSE). These regulations will allow the City to comply with federal, state and local policies regarding sanitary sewer overflows (SSO) and to allow the City to meet applicable standards and provisions for the regulations of wastewater or waste containing FOG discharges to the sewer facilities.

Section 39-56 of the City’s Municipal Code includes:

- Prohibitions that apply to all food service establishments (FSEs).
- All FSEs shall implement best management practices in their operation to minimize the discharge of FOG to the sewer systems.
- The FOG pretreatment that is required for waste, which contains FOG, to be discharged into the sewer system.
- Requirements for grease interceptors and maintenance requirements.
- FSE monitoring requirements for compliance, and record keeping requirements.
- Inspection and sampling conditions and emergency notification requirements.

100.17 CONSTRUCTION OF WATER AND SEWER IMPROVEMENTS

The Applicant (developer/builder) is responsible for the installation of all water and sewer facilities within and/or adjacent to his development to serve his development or re-development. All water and sewer improvements shall be constructed in accordance with the City’s Standard Plans and Specifications, these Design Guidelines, and the Standard Specifications for Public Works Construction, current edition.

Prior to the onset of construction activities for water and sewer improvements, the City of Santa Ana will strictly enforce the following two requirements: the project will only be released for construction after the Applicant makes the submittal of the approved water and sewer plans and provided four (4) copies of the approved construction plans; and the Applicant’s contractor has scheduled a pre-construction meeting with the City’s Construction Inspection Group after receiving the City permit.

The Applicant’s contractor constructing the water and sewer improvements shall have a Class A or C-34 license as well as have a business license to operate within the City of Santa Ana.

Water mains shall be staked for line and grade or shall be installed subsequent to the installation of the curbs but prior to paving of the streets. The curbs act as a positive grade control for setting services, meter boxes, and fire hydrants. The Applicant’s contractor shall pothole all the utility crossings prior to the beginning of construction. In addition, the Applicant’s contractor shall field verify the exact location, size, depth, and material of all existing utilities and interferences situated along the route of the proposed pipeline prior to commencement of excavation, fabrication, and installation.

The contractor shall, at his expense and cost, construct all improvements in such a manner as will protect all existing underground utilities and, in the event of any conflicts, shall notify the City immediately.

When construction has been successfully completed and the project’s final inspection has been performed, the City will issue a notice to the Applicant declaring the start of the one-year warranty period (see Section 100.20).
100.18 SEWER LINE CLOSED-CIRCUIT TELEVISION INSPECTION

All newly constructed sewer mains, laterals, and manholes must be inspected via closed circuit television camera by a National Association of Sewer Service Companies (NASSCO) certified technician. Video and database shall be provided per NASSCO Pipeline Assessment and Certification Program (PCAP) Standards and shall be submitted in a digital format to the Water Resources Division for review and final acceptance of work.

100.19 RECORD DRAWINGS

Record drawings shall be based on an “as built” review and shall show all changes in the work constituting departures from the original contract drawings. See City of Santa Ana Standard Plans for the typical dimensions practice for the preparation of the “As-Built” drawings. Upon completion of each increment of work, all required information and dimensions shall be transferred to the record drawings. Facilities and items to be located and verified on the record drawings shall include the following:

1. Point of connection;
2. Location and elevation of all valves, bends and tees;
3. Location of all services;
4. Type, manufacturer, and model of valves and fire hydrant. Turns required for complete open/close cycle shall be provided for all valves.
5. Location of all manholes and cleanouts;
6. Items located and constructed as called out in the plans need not be noted as such.

Prior to submission of the record drawings on mylar and the corresponding digital file, two sets of drawings will be submitted for review by the City’s Inspector. One set will be returned with comments if necessary. Final 4-mil mylar record drawings and the corresponding digital file will be submitted only upon incorporation of the City’s Inspector comments.

100.20 WARRANTY/GUARANTEES

The Applicant guarantees the water and sewer facilities against defects in workmanship (improper contractor’s installation) and material defects for a period of one (1) year after the date of acceptance of the facilities by the City of Santa Ana.

It is further agreed that the facilities shall be restored to full compliance with the requirements of the City of Santa Ana’s Standard Specifications and Plans, including any test requirements, if during said one (1) year period the facilities or any portion thereof are found not to be in conformance with any provisions of said Standard Specifications and Plans. This guarantee is in addition to any and all other warranties, express or implied, with respect to the facilities.

END OF SECTION
SECTION 200

DESIGN CRITERIA, WATER FACILITIES

200.1 GENERAL

The following sections are general design criteria to be used in the design of water facilities for the City of Santa Ana. The Applicant (developer/builder) and his engineer shall be responsible to ensure that designs submitted are in accordance with the City’s Municipal Code, these Design Guidelines and the City’s Standard Plans and Specifications. Where the Standard Plans and Specifications are silent, the design, and installation of the water mains and appurtenances shall conform to the American Water Works Association (AWWA) Standards and the Standard Specifications for Public Works Construction, current edition.

All water system design shall be done to safely deliver water to its customers in sufficient volume and at adequate pressure and to maintain the City’s Insurance Services Office Fire Rating. All products in contact with drinking water shall be tested and certified to meet NSF Standards 60 and 61. All materials coming in contact with potable water shall be lead free per California Health & Safety Code Section 116875.

200.2 MINIMUM SIZE MAINS

The normal minimum size distribution main pipe shall be 8-inch diameter looped line unless otherwise noted and approved. On short cul-de-sac dead-end mains 4-inch (with a maximum of ten (10) each, 1-inch services) or 6-inch (with more than ten (10) each, 1-inch service lines) lines may be allowed, however, 8-inch size main must be used to the last fire hydrant. These smaller mains may be individually approved by the City on dead-end mains without fire hydrants, and shall be sized so that sufficient water is regularly drawn to prevent stagnation.

200.3 DESIGN FLOW AND PIPE VELOCITY CRITERIA

200.3.1 Water Demands

All design flows shall be based on the Applicant’s (developer/builder) estimated water demands for the proposed use, application, establishment, commercial, industry or development or re-development project. The following water consumption factors, listed in gallons per day (gpd), can be used as a guide to estimate the water demands for some of the more common land uses:

<table>
<thead>
<tr>
<th>Land Use Classification</th>
<th>Average Water Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family</td>
<td>130 gpd/capita</td>
</tr>
<tr>
<td>Multiple Family</td>
<td>120 gpd/capita</td>
</tr>
<tr>
<td>High-Rise Residential</td>
<td>110 gpd/capita</td>
</tr>
<tr>
<td>Commercial Recreational (hotels/motels)</td>
<td>180 gpd/room</td>
</tr>
<tr>
<td>Commercial</td>
<td>2,500 gpd/acre</td>
</tr>
<tr>
<td>Industrial</td>
<td>3,500 gpd/acre</td>
</tr>
<tr>
<td>Open Space / Parks / Landscape Areas</td>
<td>3,000 gpd/acre</td>
</tr>
</tbody>
</table>
The average day demand (ADD) for a given project will consist of the cumulative total of the various units, components, and land uses. The maximum day demand (MDD) is defined as 2.0 times the average day demand (ADD). The peak hour demand (PHD) is defined as 3.5 times the average day demand (ADD).

The Applicant (developer/builder) shall provide the City with an estimate of the average day, maximum day, and peak hour demands for the project. This information will be used by the City to determine the adequacy of the existing water system, or to determine specific water system improvements required, to provide the estimated domestic water demands.

200.3.2 Distribution System Pressure Requirements

All new water mains and service connections shall satisfy the following pressure requirements. The City’s water distribution system is sized to provide the following minimum pressures during different demand conditions:

- Maximum static pressure shall be 100 psi.
- Minimum residual pressure shall be 40 psi at peak hour demands.
- Minimum residual pressure of 20 psi at maximum day plus fire demands.

Maximum distribution system pressures shall be based on static operating conditions. In accordance with the Uniform Plumbing code, individual pressure regulating valves shall be installed on all services where the static pressure exceeds 80 psi. Pressure regulators shall be installed and maintained by property owner.

200.3.3 Velocity Criteria

The criteria for velocity shall be as described in this section. The maximum velocity in a line shall not exceed 5 fps (feet per second) during the peak hour condition. The maximum velocity in a line shall not exceed 7 fps during the maximum day plus fire demand condition.

200.3.4 Submittal Requirements

The Applicant (developer/builder) shall submit to the City, along with the improvement plans, substantiating engineering calculations for demand, velocity and pressure. For larger development or redevelopment projects, the City of Santa Ana may need to perform a hydraulic distribution network analysis of the project to determine the capability of the existing water system to serve the proposed project. In these cases, the Applicant (developer/builder) will be responsible for the full cost of this analysis.

200.4 FIRE FLOW REQUIREMENTS

The design criteria to be used for determining fire flow requirements shall be the actual fire flow requirements as determined by the Orange County Fire Authority. Before designing the domestic water system for a project, the Applicant shall obtain the Orange County Fire Department’s fire flow requirements for the project. These requirements, plus indication of the Fire Authority's approval, are required to be on the improvement plans prior to the City of Santa Ana's approval.

All existing fire flow tests shall be performed by an approved contractor, hired by the Applicant, and done in the presence of the City of Santa Ana water staff. The City of Santa Ana will charge a fee, per the City of Santa Ana Miscellaneous Fee Schedule, to witness this fire flow test.
For general planning purposes, the following fire flow demands can be used, as the minimum:

200.4.1 Residential Dwelling Units

The water system shall be capable of providing a single family residential fire flow minimum of 1,500 gpm, combined flow, for a 4-hour duration from any two adjacent hydrants at a minimum 20 pounds of residual pressure (psi) at the main.

For residences 3,600 square feet and under and not contiguous with open space areas, the minimum requirement shall be 1,000 gpm per hydrant at 20 psi (for a total flow of 2,000 gpm). For residences 3,600 square feet and under which are contiguous with open space areas, the minimum requirement shall be 1,000 gpm per hydrant at 30 psi (for a total flow of 2,000 gpm). For residences over 3,600 square feet, the Fire Authority shall be consulted. The open space area is defined as any area bordering an undeveloped open space with no fire control mechanism.

For multi-family residential, the minimum requirement shall be 1,500 gpm per hydrant at 20 psi (for a total flow of 3,000 gpm).

New residential dwelling units may be constructed with residential fire sprinkler systems (if required by NFPA 13D or NFPA 13R) which will reduce the minimum fire flow requirements.

200.4.2 Schools and Commercial Areas

The system shall be capable of providing a fire flow of at least 4,000 gpm for 3 hours duration (or as required by the Fire Authority) out of any two adjacent hydrants at a minimum 20 pounds of residual pressure at the main. Most schools and commercial areas will have built-in sprinkler protection for the buildings which will reduce the minimum fire flow requirements.

200.4.3 Industrial Areas

In industrial developments requiring a high fire flow, the applicant shall consult with the Fire Authority to discuss options for upgrading the domestic water system to deliver the fire flow or provide built-in sprinkler protection for the structures.

200.5 TYPE OF MAIN PIPE

**Distribution Mains.** All distribution mains, 4-inches thru 12-inches in diameter shall be AWWA C-900 P.V.C. pipe, DR-14 or AWWA C-151 Ductile Iron Pipe, Class 350. All other pipe materials require special review and approval from the Water Resources Division.

**Transmission Mains.** For transmission mains, 16-inch thru 20-inch diameters, pipe shall be ductile-iron pipe, Class 200, or AWWA C-905 P.V.C. pipe, DR-18 or CML&C steel pipe. For pipe, 24 inches and larger in diameter, only CML&C steel pipe will be allowed.

All ductile iron pipe and fittings shall be polyethylene encased in accordance with AWWA C-105.

All PVC pipe shall be installed with tracer wire and detectable warning tape in accordance with the City’s Standard Plans.
200.6 MINIMUM DEPTH TO TOP OF WATER MAIN PIPE

200.6.1 12” and Smaller Mains

The top of the pipe is to be a minimum of 36-inches below the finished street grade, unless indicated otherwise on the improvement plans because of unusual field conditions.

For PVC pipe, the top of pipe is to be a minimum of 30-inches below the street subgrade or 30 inches below the undercut, whichever is greater.

The top of pipe is to be a minimum of 48 inches below finish grade in unpaved areas.

200.6.2 Larger than 12” Mains

The top of the pipe is to be a minimum of 42-inches below the finished street grade, unless indicated otherwise on the improvement plans because of unusual field conditions.

For PVC pipe, the top of the pipe is to be a minimum of 36 inches below the street subgrade or 36 inches below the undercut, whichever is greater.

The top of pipe is to be a minimum of 54 inches below finish grade in unpaved areas.

200.7 STANDARD LOCATION

Water main center-lines shall normally be located six (6) feet from the curb face for all pipelines 12-inches in diameter and smaller. For pipelines 16-inches in diameter and larger, the water main center-line shall be located eight (8) feet from the curb face. Alignments may need to be deflected to avoid cross gutters, concrete bus lanes or other interferences as directed by the City of Santa Ana.

Where water pipelines are designed to cross perpendicular beneath retaining walls or other structures (specific written permission required for each instance), the pipeline shall be constructed in a steel pipe casing of sufficient size and thickness and with a minimum vertical clearance of at least eighteen (18) inches from the footing or structure itself.

200.8 WATER VALVE SPACING AND ARRANGEMENTS

Resilient wedge gate valves shall be used on all water mains 12-inches in diameter and smaller. Butterfly valves shall be used on all water mains 14-inches in diameter and larger.

Valves shall be adequately spaced to permit pipeline isolation for repair and maintenance activities and to minimize the quantity of customer shutdowns during these repair activities. As a general rule, valves shall be spaced at: about 800 feet in residential areas; about 500 feet in commercial and industrial areas; and 1,300 feet on transmission mains.

In general, there shall be a minimum of two (2) valves at each tee intersection of two distribution mains. If the two distribution mains cross, there shall be a minimum of three (3) valves and, at major distribution points, there shall be four (4) valves. Valves shall be flanged when attached to a tee or a cross.

On long blocks, intermediate valves should be installed so that no more than twenty-eight (28) dwelling units, six hundred (600) feet of main, or two (2) fire hydrants will be out of service at any time.
Additional looping of the main lines may be necessary to satisfy this condition and the arrangement of
valves within the distribution system will be reviewed to identify the optimum network layout.

A valve is required on the water main between redundant services/meters serving a large multi-family
development, a large commercial/mixed used development, or a private water system.

In most cases where water mains pass through easements outside traveled streets, a valve shall be located at
each end of the easement.

The final determination of the quantity of valves and their locations shall be as directed and approved by the
City of Santa Ana.

200.9 SEPARATION REQUIREMENTS

Separation requirements are specified within Section 100.12 of these Design Guidelines.

The following is a brief summary of the Department of Drinking Water (DDW) regulations:

New water mains shall be installed at least ten (10) feet horizontally from and one (1) foot above, any
parallel sewer pipeline. New water mains shall be installed at least four (4) feet horizontally from, and one
(1) foot vertically above, any parallel recycled or storm drain pipelines.

If crossing a pipeline containing sewage, recycled water, or storm drainage, a new water main shall be
constructed no less than 45-degrees to and at least one (1) foot above the pipeline. No connection joints
shall be made in the water main within eight (8) horizontal feet of the other pipeline.

The minimum separation distances noted above shall be measured from the nearest outside edge of each
pipe barrel.

Normally, water, sewer, recycled water, and storm drains shall be located vertically from the street surface
in order of the higher quality, i.e., domestic water shall be above recycled water/storm drains, and recycled
water/storm drains shall be above sewer.

Whenever a crossing must occur where an existing sewer main is within one (1) foot of a new domestic
water main, special construction will be required. Encasement may be required if vertical separation
requirements cannot be met.

If a sewer is above a water main, the special construction shall extend a minimum of eight (8) feet of
horizontal clearance on both sides, or if not feasible, center the piece of new water pipe under the crossing
to maximize this horizontal clearance.

200.10 FIRE HYDRANTS

200.10.1 Fire Hydrant Locations

The location of fire hydrants shall be as determined by the Orange County Fire Authority. The exact
location with respect to the curb and sidewalk shall be as shown in the City of Santa Ana’s Standard Plans.

Hydrants shall be located in such a manner to provide complete accessibility and to minimize the possibility
of damage from vehicles or injury to pedestrians. Hydrants shall never be located within an ADA pedestrian
ramp.
Where practical, fire hydrants shall be located on the same side of the street as the water main, near intersections, corners, or on residential lot lines. No fire hydrant shall be located within 3 feet of a driveway, or closer than 30 feet to any combustible structure and 36-inches from any aboveground structure. For all cases, the location of the fire hydrant shall meet Americans with Disabilities Act (ADA) requirement that a minimum of 48-inch clearance be maintained from any obstruction in the pedestrian walkway.

200.10.2 Fire Hydrant Spacing

The maximum fire hydrant separation shall be 300 feet from fire hydrant to fire hydrant. The actual spacing will be determined by the Orange County Fire Authority.

200.10.3 Types of Hydrants

Wet barrel type hydrants with break off check valve as shown in the City of Santa Ana’s Standard Plans are to be used at all locations.

In situations where the fire hydrant run is over 50 feet, the size of the hydrant lateral shall be 8-inches.

200.10.4 Plan Requirements

Fire hydrants shall be shown on the plans where the hydrant is to be located with respect to the property line, and what easements will be provided. The building foot prints or building pad areas are also to be shown.

200.11 RESIDENTIAL FIRE SPRINKLER SYSTEMS

All residential fire sprinkler systems shall be designed, fabricated, and installed in accordance with NFPA 13R or 13D and amendments as adopted by the Orange County Fire Authority. At least one water pressure gauge shall be installed on the riser assembly for multi-family residential units. All valves shall have permanently affixed signs that designate their function. The water flow switch shall be connected to the service panel on an uninterruptible house circuit. Underground mains and lead-in connections shall be flushed before connection is made to the sprinkler piping.

All new sprinkler systems and additions or modifications to existing piping shall be hydrostatically tested in accordance with NFPA 13R or NFPA 13D. All FDC, wall PIVs, and exposed exterior riser valves shall be painted OSHA safety red. Other fire sprinkler or supply pipe exposed or susceptible to wet conditions shall be painted (any color) or otherwise coated to inhibit corrosion. Stainless steel assemblies and piping may be left unpainted provided that any hose connections, valves, or other components operated by the Fire Department are painted OSHA safety red.

200.12 MULTI-FAMILY DWELLINGS

As a minimum, each multi-story building housing multi-family dwellings shall be provided with at least one public water master meter as required per Section 100.8 of these Design Guidelines.

For buildings and other structures designated as essential facilities and categorized as Risk Category IV Structures per the California Building Code (such as hospitals and emergency treatment facilities) a second public water master meter shall be provided. A line valve is required on the water main between these redundant services/meters. This redundant public service and meter will allow service to the building to be maintained if one of the master meters require to be shut-down for maintenance or repair activities.
200.13 SERVICE MATERIALS AND MINIMUM SERVICE SIZE

200.13.1 General

Approved materials and manufacturers for various service material tubing and connections are shown on the City of Santa Ana's Standard Plans.

200.13.2 Minimum Domestic Service Size

Minimum domestic service line size shall be 1-inch in diameter. The sizing of the service shall be specified on the plans designated by lot numbers. Services for private-street residential, commercial or industrial developments are to be as shown on the approved improvement plans and may require a detail on the plans of the location of the proposed service.

200.13.3 Type of Service Line

Acceptable service line material is as described below:

- 1-inch and 2-inch service lines shall be Type “K” soft copper tubing.
- 4-inch and larger service lines shall use PVC pipe or Ductile Iron Piping per Section 200.5.

200.13.4 Meters

All meters will be furnished and installed by the City of Santa Ana upon completion of a water service application, account activation and payment of all applicable fees.

200.13.5 Pressure Reducing Valves

Individual pressure regulators are required by the Uniform Plumbing Code if the average static pressure in the public water main is 80 psi or more. Where required, the water service shall be provided with approved pressure regulators set at 80 psi, and shall be installed per City of Santa Ana’s Standard Plans or appropriate governing agency's standards.

200.14 STANDARD WATER NOTES

The following Standard Water Notes shall be included on all improvement plans or water system construction plans:


2. Construction of water mains and appurtenances shall only be performed by qualified contractors with a valid California Contractor A or C34 license.

3. No person, other than City of Santa Ana Water Resources Division staff certified by the State of California as a Water Distribution Operator, shall be allowed to operate the City’s water system valves.
4. No person, other than City of Santa Ana Water Resources Division staff certified by the State of California as a Water Distribution Operator, shall shut water service off to any customer.

5. All newly constructed water mains and appurtenances shall be disinfected and tested in accordance with AWWA Standard C600’s, prior connecting to the City’s water distribution system. Disinfection testing results shall be submitted to the Water Resources Division when required for review and approval prior to connecting to the City’s water distribution system.

6. Water mains will be hydrostatic tested at 200 psi for 2 hours. New water mains cannot be tested against an existing valve but can be tested using a test plate.

7. Requests to shut-down the water distribution system for tie-ins or other purposes shall be coordinated with the Water Resources Division staff at least 2 weeks in advance at (714) 647-3320. All customers affected by the proposed shut down shall be noticed 48 hours in advance by the contractor.

8. The City of Santa Ana Water Resources Division cannot guarantee a complete shutdown of existing mains. The contractor shall be responsible for dewatering and isolation of construction for testing or any other purposes. Contractor is responsible for getting the air out of the water line by method approved by Water Resources Division.

9. All fire hydrants which are out of service or new fire hydrants which have not been accepted for service shall be covered with a sack indicating that the hydrants are not in service.

10. Maintaining water service shall be the responsibility of the contractor. Method of providing temporary service must be approved by the Water Resources Division. The water shall be safe for drinking in accordance with State of California Water Resources Control Board (SWRCB) Drinking Water Program (DWP).

11. Water meter will not be installed nor water turned on until the backflow devices required for the building and irrigation systems have been installed, tested, approved, and certified. Contact Water Resources Division at (714) 647-3320.

12. All water mains shall be AWWA C-900, DR 14 pipe or AWWA C-151 Ductile Iron Pipe. All other pipe materials require special review and approval from the Water Resources Division.

13. Water mains shall have 36-inches minimum cover to finished grade.

14. Contractor to verify depth and location of all utilities prior to trenching.

15. Private water appurtenances such as backflow preventers, fire hydrants and standpipes, and valves shall be painted as follows:
   
a. Domestic Water Blue
b. Potable Irrigation Green
c. Recycled Irrigation Purple
d. Fire Protection OSHA Safety Red

16. Do not cut or mill asbestos cement pipe. Where joining existing asbestos cement pipe, remove entire pipe segment to nearest joint or snap ACP with a snap cutter and joint to new pipe with a properly dimensioned adapter.

17. Do not tap existing water mains without the presence of a certified water inspector. Pressure test tapping sleeve in the presence of a certified water inspector before tapping existing main.
18. Final acceptance will not occur until original record drawings on mylar and digital file are delivered to and accepted by the City’s Inspector. Show all field changes on record drawings.

19. Trench plates shall be flush with pavement.

20. When public water facilities are located on private property, easement documents are to be submitted to City for approval prior to a permit being issued.

21. All recycled water projects require review and approval by the Water Resource Division.

22. Water system hardware and appurtenances removed from the field shall be returned and delivered to the City Water Resource Division Yard located at 215 S. Center Street. Prior notification of the delivery is required at (714) 647-3320.

200.15 MISCELLANEOUS STANDARD GUIDELINES

1. The Applicant’s contractor shall have a copy of the City’s Standard Plans and Specifications, and the approved improvement plans on the job site at all times.

2. Water mains shall be staked for line and grade or shall be installed subsequent to the installation of the curbs but prior to paving of the streets.

3. Any survey work necessary to ensure correct horizontal and vertical alignment shall be provided by the Applicant.

4. All valve box and water service box or manhole frame and cover shall be adjusted to finished pavement grade by the Applicant’s contractor. This is to be done prior to placing seal coat.

5. No facility is to be backfilled until inspected by the City.

6. All valve vaults and covers shall be designed and specified per current accepted engineering practice and the manufacturer’s recommendations, provided that they: support HS20-44 loads, plus impact and earth pressures when situated in an existing or future roadway; support 300psf plus earth pressure for non-roadway installations; and all metal parts shall be provided in brass, cast iron, aluminum and stainless steel materials.

7. Thrust blocks shall be installed in accordance with the City’s Standard Plans at all pipe deflections (greater than 5 degrees), all angle points (both horizontal and vertical), and at all fittings.

8. Maximum deflection at pipe joints allowable on curved alignments shall be in accordance with the manufacturer’s recommendations. PVC pipe sections shall not be bent to achieve a curve. Pipe deflections for short radius curves and angle points shall be accomplished by means of standard fittings. The location of all fittings shall be detailed on the plans.

9. Water meters shall not be located within three (3) feet of a driveway.

10. All water service laterals shall be constructed perpendicular to the water main without bends or angles from the connection point on the mains.

11. A valve anchor shall be installed on all valves in accordance with City’s Standard Plans.

12. All water main line valves shall be maintained so as to be accessible during tract development and construction.

13. Curbs shall be inscribed with a "W" indicating locations of all domestic water services. Letter inscription shall be made using a 4-inch power tool wheel grinder.

14. Curbs shall be inscribed with tie downs for all valve locations. Letter inscription shall be made using a 4-inch power tool wheel grinder.
15. At intersections and bus stops with concrete pads, the main line shall be roped to avoid cross gutter conflict.

16. Separate quantity estimates, for the domestic water systems, are to be included on the plans indicating quantity of pipe, valves, fire hydrants, domestic water services, etc.

17. The plans shall show, in plan and profile views, the position of all other known existing underground utilities as well as proposed underground utilities. Vertical clearance at crossings shall be indicated by showing top of pipe and bottom pipe elevation at point of intersection.

18. Blow-off assemblies shall be installed at the end of all mains, except if there is a fire hydrant, in accordance with the City’s Standard Plans. Temporary blow-offs shall be installed at service stub-outs for testing and flushing purposes.

19. Combination air valves are to be installed at all high points of water mains in accordance with the City’s Standard Plans.

20. Water sample stations shall be provided as required by the Water Resources Division.

21. All unused water facilities shall be abandoned at the water main as directed by the City. Prior to any abandonment of services, the contractor shall ensure the service line valve is closed and restrained to the main. The service line shall be cut and plugged at the service line valve, a thrust block installed and valve boxes removed. Meter boxes and water valve boxes for abandoned services shall be removed and the surface improvements shall be restored as directed by the City.

END OF SECTION
SECTION 300

DESIGN CRITERIA, SEWER FACILITIES

300.1 GENERAL

The following sections are design criteria to be used in the design of sewer facilities for the City of Santa Ana. The Applicant (developer/builder) and his engineer shall be responsible to ensure that designs submitted are in accordance with the City’s Municipal Code, these Design Guidelines, and the City’s Standard Plans and Specifications. Where the Standard Plans and Specifications are silent, the design and installation of the sewer mains and manholes shall conform to the Standard Specifications for Public Works Construction, current edition.

300.2 MINIMUM SIZE

The City of Santa Ana will not accept for maintenance any sewer main smaller than 8 inches in diameter.

300.3 MINIMUM AND MAXIMUM SLOPE DESIGN

All sewers shall be designed and constructed to provide a mean velocity of not less than two (2) feet per second (fps) when flowing half-full at the estimated peak flow. Peak flows shall be calculated using Manning’s formula with an “n” value of 0.013. The following are minimum slopes by pipe size:

<table>
<thead>
<tr>
<th>Sewer Size (inches)</th>
<th>Minimum Slope in Feet per 100 Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0.40</td>
</tr>
<tr>
<td>10</td>
<td>0.28</td>
</tr>
<tr>
<td>12</td>
<td>0.22</td>
</tr>
</tbody>
</table>

These are absolute minimum slopes. Sewers shall be designed to provide steeper slopes whenever possible up to the stated maximum slope. The maximum allowable slope shall be the slope which generates a maximum flow velocity of eight (8) fps at the peak flow rate.

The maximum slope for sewer laterals is forty (40%) percent. The desirable maximum is ten (10%) percent.

The maximum slope for sewer main lines is 20 (20%) percent. The desirable maximum is ten (10%) percent.

Under special conditions, the Applicant may request slopes of less than the minimums stated. The Applicant must submit this request along with back-up data and calculations to show that the depth of flow at the design average flow will be 0.3 of the pipe diameter or greater. The Applicant must also submit computations to show the depths of flow at minimum and average rates of flow. The request shall also detail the reasons why the normal minimum slopes cannot be achieved. The request and supporting data will be reviewed by the City.
300.4 FLOW DESIGN CRITERIA

300.4.1 Sewerage Flows

All design flows shall be based on the Applicant’s (developer/builder) estimated sewerage generation rates for the proposed use, application, establishment, commercial, industry or development or re-development project. The following average sewage flow coefficients can be used as a guide to estimate the sewerage generation for some of the more common land uses:

<table>
<thead>
<tr>
<th>Land Use Classification</th>
<th>Average Sewage Flow Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Density Residential (8 du/ac max)</td>
<td>0.0032 cfs/acre</td>
</tr>
<tr>
<td>Medium Density Residential (15 du/ac max)</td>
<td>0.0045 cfs/acre</td>
</tr>
<tr>
<td>Med/High Density Residential (35 du/ac max)</td>
<td>0.0105 cfs/acre</td>
</tr>
<tr>
<td>Med. Urban Center Residential (60 du/ac max)</td>
<td>0.0180 cfs/acre</td>
</tr>
<tr>
<td>Urban Center Residential (90 du/ac max)</td>
<td>0.0270 cfs/acre</td>
</tr>
<tr>
<td>Mixed Use Corridor (130 du/ac max)</td>
<td>0.0400 cfs/acre</td>
</tr>
<tr>
<td>Commercial</td>
<td>0.0050 cfs/acre</td>
</tr>
<tr>
<td>Industrial</td>
<td>0.0060 cfs/acre</td>
</tr>
<tr>
<td>Schools</td>
<td>25 gals/day per student</td>
</tr>
<tr>
<td>Medical Center</td>
<td>0.0250 cfs/acre</td>
</tr>
<tr>
<td>Hospital</td>
<td>1,000 gals/day per bed</td>
</tr>
</tbody>
</table>

300.4.2 Peak Flows

The peak flow is assumed to be 3.0 times the average sewage flow.

300.4.3 Design Criteria

Design peak flows in pipelines 12 inches in diameter and smaller are to be limited to approximately $d/D = 0.5$ (½ of full depth). Pipes over 12 inches in diameter are to be limited to approximately $d/D = 0.75$ (3/4 of full depth) at design peak flows.

300.5 TYPE OF PIPE

All sewer mains shall be vitrified clay pipe (VCP) or PVC SDR-26 pipe. All other pipe materials require special review and approval from the Water Resources Division. Sewer pipe material shall remain constant (continuous) between manholes. Transitioning between pipe material types (such as VCP to PVC), and size changes, may only be done at manholes.

All sewer laterals shall be either extra strength VCP or SDR-26 PVC pipe. The material used for construction of sewer laterals shall match the materials of construction for the adjacent sewer main to which they are connected.
All VCP pipe and fittings shall be extra strength vitrified clay pipe with compression joints conforming to Subsection 207-8 of the Standard Specifications for Public Works Construction.

All PVC pipe, fittings, couplings and joints shall be in conformance with the size, material and performance requirements of ASTM D3034, SDR 26 and shall have gasket joints. Rubber gaskets, for PVC pipe, shall be factory installed and conform to ASTM F477. All PVC sewer pipe shall conform to Subsection 207-17 of the Standard Specifications for Public Works Construction.

300.6 STANDARD LOCATION AND ALIGNMENT

300.6.1 Location

Wherever possible, in local, residential, industrial, and secondary streets, the sewer main is to be located five (5) feet south or five (5) west of the street centerline. Where there is a center median, the sewer main is to be located in the center of the driving lane nearest to the center of the street. Sewers shall not be located in landscape median strips or parking lanes. Within alleys, the sewer main shall be offset three (3) feet from the centerline to clear the concrete gutter.

On curvilinear streets, the sewer main shall be designed generally parallel with the centerline of the street by the use of straight chord segments of sewer between manholes. Where curve radii for horizontal curves are so short that the resulting sewer manhole spacing is less than 300 feet, curved sewers will be considered by the City. A pre-design meeting with the City should occur to discuss acceptable alignments for the curved sewer as well as a concurrent review of the other underground utility locations which might be affected by straight sewer segments on the proposed curved roadway.

A maximum horizontal separation between sewer and domestic water mains shall be achieved as required by Section 100.12 of these Design Guidelines. Typically, water mains shall be installed on the opposite side of the centerline from the sewer mains.

Sewer mains that are constructed in a common trench with another utility will not be accepted by the City. Adequate horizontal and vertical spacing shall be maintained in accordance with Section 100.12 of these Design Guidelines.

300.6.2 Radius of Curvature

Where curved sewers are allowed, the following minimum radius of curvature in feet per type of pipe:

<table>
<thead>
<tr>
<th>VCP</th>
<th>Nominal Pipe Size (inches)</th>
<th>Minimum Radius of Curvature</th>
<th>Minimum Radius of Curvature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(5’ joints)</td>
<td>(6’ joints)</td>
</tr>
<tr>
<td>8-12</td>
<td></td>
<td>150’</td>
<td>175’</td>
</tr>
<tr>
<td></td>
<td>PVC</td>
<td>Minimum Radius of Curvature (For Standard Joint Length)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>280’</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>350’</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>420’</td>
</tr>
</tbody>
</table>
300.7 STATIONING

Centerline stations for sewer mains shall be shown (example: 0+00) and will be independent of street stationing. All manholes are to be numbered (example: MH No. 1). Sewer stations start at 0+00.00 at the downstream point of connection and increases upstream to the last manhole on the sewer main. Intersecting sewer lines shall be independently stationed from their downstream point of connection and increase to the last manhole or terminal clean-out. Each line shall be independently labeled for identification as “Sewer Line A”, “Sewer Line B”, etc.

300.8 MINIMUM DEPTH

When downstream connections or existing conditions allow, the minimum cover from finish street grade to top of sewer main pipe is to be seven (7) feet. Four inch (4”) and six inch (6”) diameter sewer laterals shall be installed so that there is a minimum of five (5) feet of cover as measured from the grade at the top of the curb to the top of the pipe where it crosses the curb line. At the time of construction, stakes shall be provided for location and grade of each sewer lateral.

300.9 MANHOLES

300.9.1 Manhole Location and Spacing

A manhole will be required at all:

A. Changes of direction or alignment;
B. Changes in grade or slope;
C. Changes in pipe size;
D. Ends of each sewer main;
E. Intersection of sewer laterals larger than six inches (6”) in diameter;
F. Intersection of two (2) or more sewer mains (match crown lines); and
G. Ends of sewer laterals, at the property (or easement) line where the lateral is eight inches (8”) or larger.

Manholes spacing shall be 400 feet for 8”, 10” and 12” sewer mains. If sewer is curved, closer spacing of manholes will be required. Only one curve (horizontal or vertical) shall be allowed between any two manholes.

Extend all temporary dead ends to a point not to exceed 200 feet beyond the last manhole. Install a cleanout per the City’s Standard Plans. All terminations over 200 feet beyond the last manhole shall terminate with a standard manhole.

Manholes shall have stubs placed if future extensions are possible.

Laterals in manholes shall enter manhole with spring line of the lateral at the same elevation as the top of the shelf. The channel shall be cut in the shelf.
300.9.2  Manhole Size and Depth

Manholes shall be precast reinforced concrete with eccentric cone in accordance with the City’s Standard Plans. Minimum manhole diameter shall be 48-inches. The manhole necking and the frame and cover shall be 24-inches in diameter.

Manhole depth is calculated from finish grade to lowest pipe invert. Minimum manhole depth is to be eight (8) feet, unless otherwise approved by the City.

There are additional requirements for larger diameter manholes where the sewer main is at greater depths. The diameter requirements for manholes at greater depths are as follows:

<table>
<thead>
<tr>
<th>Depth of Manhole</th>
<th>Manhole Shaft Diameter</th>
<th>Frame and Cover Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 feet to 15 feet</td>
<td>48-inches</td>
<td>24-inches</td>
</tr>
<tr>
<td>15 feet to 22 feet</td>
<td>60-inches</td>
<td>30-inches</td>
</tr>
<tr>
<td>Greater than 22 feet</td>
<td>72-inches</td>
<td>36-inches</td>
</tr>
</tbody>
</table>

Manholes deeper than twenty (20’) feet shall have steel-reinforced concrete bases. Reinforcement shall be provided for the specific soils conditions at each deep manhole location. The reinforcement design shall be submitted to the City under the signature and stamp of a Licensed California Civil Engineer.

For larger sized sewer mains or special circumstances, the manhole size will be as shown on plans.

300.9.3  Allowable Head Loses

Allowable head loss in manholes shall be as follows:

1. Straight run through manholes based on 0.10 foot loss
2. Right angle turn in manholes based on 0.5 velocity head loss or 0.20 foot, whichever is greater.

300.9.4  Manhole Frame and Covers

Manhole frame and covers shall be cast-iron and shall be 24 inches in diameter with the word “SEWER” cast in the cover in accordance with the City’s Standard Plans. Larger size covers may be specified for special conditions on plans. Frame and covers shall be provided by the contractor as a “set”, such that they are matched for a snug and proper fit that will minimize movement and noise caused by traffic.

Temporary covers may be necessary in streets under construction. In these cases, the manhole shaft shall be left six (6) inches, minimum, below subgrade. A heavy metal plate shall be provided to cover the manhole opening. Cleats shall be provided in at least four (4) points for the underside of the temporary cover to prevent the temporary cover from moving. These cleats shall extend a minimum of 3-inches from the cover plate and shall be welded to the plate.

Plywood shall be cut to the shape and size of the manhole base and placed on top of the base before the temporary cover is placed on the shaft.
At the completion of final paving, each manhole shall be raised to final grade by the installation of the necessary sized grade rings and the installation of the permanent frame and cover assembly. The plywood shall be removed prior to occupancy.

Whenever manholes are constructed in unpaved areas, they shall be set 0.2 feet above the adjacent finished grade and shall have a concrete pad built around the manhole cover in accordance with the City’s Standard Plans.

300.9.5 Paved Access to Manholes

All sewer manholes shall be designed and constructed with a direct paved access to them.

300.10 TERMINAL CLEANOUTS AND CLEANOUTS

Using of terminal cleanouts shall be limited to the following instances with Water Resources Division review and approval:

A. At the end of short sections of sewer main, less than 200 feet long, which will be extended in the near future.
B. At the end of end of all 6-inch commercial and industrial sewer lateral installation at the property line. All laterals which are 8-inch and larger shall have manholes, not terminal cleanouts, at the property line or easement boundary.
C. Cleanouts shall be provided at property line in accordance with the City’s Standard Plans.

300.11 SEPARATION BETWEEN WATERLINES AND SEWERLINES

Horizontal and vertical separation between sewer mains and water mains shall be provided in accordance with Section 100.12 of these Design Guidelines.

Similar consideration for pipeline separation shall be given to other adjacent underground utility conduits with a goal of minimizing future impacts to the City pipelines because of future construction or repair activity in accordance with Section 100.12 of these Design Guidelines.

300.12 SEWER LATERALS

All sewer laterals shall be located by the Applicant and shown (with stationing) on the improvement plans. The sewer laterals shall be at right angles or radial to street centerline. Typically, the sewer lateral shall be located at the center of the lot or five (5) feet above the downstream lot line.

Sewer laterals shall be constructed to the property line from the main sewer line. There shall be a separate lateral with cleanout for each individually owned building and each individually owned occupancy.

Sewer laterals shall have a minimum four inches (4”) in diameter for single-family residential occupancy. Apartment, condominium and commercial developments shall have at least one (1) six-inch (6”), or one (1) eight-inch (8”) lateral to serve each building in the development which contains more than one dwelling unit. Sewer laterals to any master-meter facility shall have a lateral which is a minimum of six inches (6”) in diameter.
A sewer lateral from its connection to a building on the property to its point of connection with the sewer main shall remain the responsibility of the property owner or user with regard to maintenance, repair and upkeep as stated within the City’s Municipal Code Section 39-50.

300.13 SEWER LINE CLOSED-CIRCUIT TELEVISION INSPECTION

All newly constructed sewer mains, laterals, and manholes must be inspected via closed circuit television camera by a National Association of Sewer Service Companies (NASSCO) certified technician. Video and database shall be provided per NASSCO Pipeline Assessment and Certification Program (PCAP) Standards and shall be submitted in a digital format to the Water Resources Division for review and final acceptance of work. Any deficiencies or violation of the City’s Standard Plans and Specifications found during the TV inspections or any TV inspections during the warranty period shall be corrected immediately by the Applicant and/or his contractor at the sole expense of the Applicant (developer/builder).

The following work must be completed prior to television inspection: all sewer mains installed and backfilled; all manholes constructed and all channeling completed; pipeline to be inspected has been balled and flushed; final air test has been completed and PVC lines have been mandrelled; and the contractor has pre-pulled a tag line through each section of pipeline to be videoed and has secured it at each manhole.

Closed circuit television inspection (CCTV) shall also include cleaning of the sewer main prior to videoing in accordance with Section 500-1.1.4 of the Standard Specifications for Public Works Construction. All CCTV work shall conform to the current NASSCO-PACP Standards for sewer main and sewer laterals.

300.14 STANDARD SEWER NOTES

The following Standard Sewer Notes shall be included on all street improvement plans or sewer system construction plans:

1. Construction and installation of all sewer mains and appurtenances shall be in accordance with the City of Santa Ana Standard Plans and Specifications. Where the Standard Plans are silent, construction and installation of sewer mains and appurtenances shall conform to the Standard Specifications for Public Works Construction, current edition.

2. Construction of sewer mains and appurtenances shall only be performed by qualified contractors with a valid California Contractor A or C34 license.

3. All newly constructed sewer mains and appurtenances shall be tested in accordance with the Standard Specifications for Public Works Construction. All newly constructed sewer mains, laterals and manholes must be inspected via closed circuit television camera by a National Association of Sewer Services Companies (NASSCO) certified technician and video submitted in a digital format to the Water Resources Division for review and final acceptance of work.

4. All sewer mains shall be vitrified clay pipe (VCP) or PVC SDR-26 pipe. All other pipe materials require special review and approval from the Water Resources Division.

5. Trench plates shall be flush with pavement.

6. Contractor to verify depth and location of all utilities prior to trenching.

7. When public sewer facilities are located on private property, easement documents are to be submitted to City for approval prior to a permit being issued.
8. Final acceptance will not occur until original record drawings on mylar and digital format are delivered to and accepted by the City’s Inspector. Show all field changes on record drawings.

9. Sewer system manhole covers and rings removed from the field shall be returned and delivered to the City Water Resources Division Yard located at 215 S. Center Street. Prior to notification of the delivery is required at (714) 647-3320.

300.15 MISCELLANEOUS STANDARD GUIDELINES

1. The Applicant’s contractor shall have a copy of the City’s Standard Plans and Specifications, and the approved improvement plans on the job site at all times.

2. Sewer lengths are calculated horizontal distances along the centerline of the sewer.

3. All manholes and other important points shall have an equation showing the equivalent street stationing.

4. Sewer mains, manholes, and sewer laterals shall be installed prior to paving of the streets.

5. All sewer mains, manholes, and sewer lateral fittings shall be staked by a licensed surveyor, and complete set of cut sheets shall be supplied to the City Inspector. All residential laterals not normal to sewer shall have end of lateral at property line staked and tied to a property corner as shown on the plans.

6. No facility is to be backfilled until inspected by the City.

7. All manhole frame and cover shall be adjusted to finished pavement grade by the Applicant’s contractor. This is to be done prior to placing seal coat.

8. Use of drop manholes requires approval from the Water Resources Division.

9. In order to prevent accidental use of the new sewer prior to completion and acceptance, the outlet or inlet to existing tie-in manhole(s) shall be sealed with broken brick and mortar. Installation of these plugs shall be approved by the City. Plugs shall be removed at the time of final acceptance.

10. Any work to be performed inside a live manhole shall be done in accordance with Cal OSHA "Confined Spaces" and City of Santa Ana manhole entry regulations. Manhole entry without City personnel present is not allowed.

11. Curbs shall be inscribed with an "S" indicating location of all sewer laterals. Letter inscription shall be made using a 4-inch power tool wheel grinder.

12. Separate quantity estimates for sewer systems are to be included on the plans indicating quantity of pipe, manholes, and laterals.

13. The plans shall show, in plan and profile views, the position of all other known existing underground utilities, as well as proposed underground utilities. Vertical clearance at crossing shall be indicated by showing the top of pipe and the bottom pipe elevations at point of intersection.

END OF SECTION
## SECTION 400

### DOCUMENT REVISION LOG

### 400.1 REVISIONS

The following is a summary of revisions that have been made to this document.

<table>
<thead>
<tr>
<th>Revision No.</th>
<th>Section</th>
<th>Description</th>
<th>Date Revised</th>
<th>By</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>All</td>
<td>Document creation</td>
<td>3/16/17</td>
<td>Nabil Saba</td>
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END OF SECTION